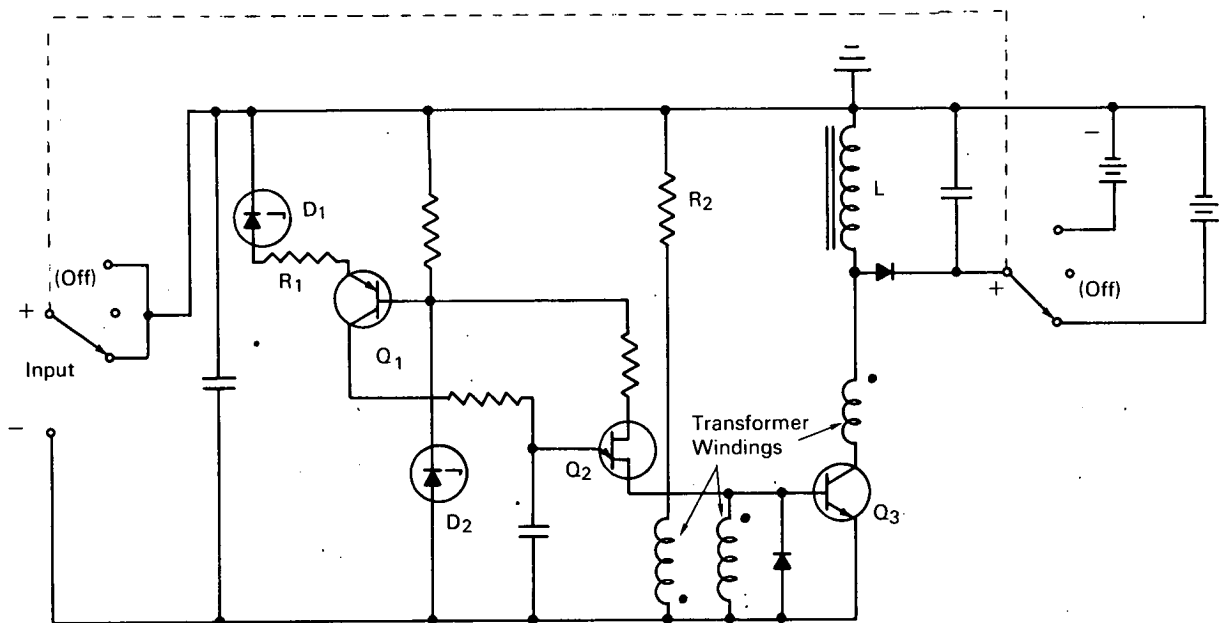


NASA TECH BRIEF



NASA Tech Briefs are issued to summarize specific innovations derived from the U.S. space program, to encourage their commercial application. Copies are available to the public at 15 cents each from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

Converter Provides Constant Electrical Power at Various Output Voltages



The problem:

To design a power converter that will transfer electrical energy at a constant rate from a solar cell source to a number of individual batteries, which are to be charged one at a time. For a particular application on a spacecraft, the power converter was required to invert the polarity of the solar cell source and also provide the correct charging voltage, which ranged from 3 to 25 volts.

The solution:

A circuit that utilizes an inverted flyback technique as a means of transferring energy to the battery to be charged. Energy is stored in an inductor during a portion of the cycle and is released to the battery during the remainder of the cycle. The power (product of the input voltage and current) corresponding to the

peak power point of the voltage vs current characteristic of the solar cell source is transferred to the battery, and does not change as a function of battery voltage.

How it's done:

The saturable core transformer (consisting of three windings on one core) and transistor Q₃ comprise the flyback switching circuit. This transformer determines the energy storage period of the inductor L. Q₂ supplies the initial turn-on pulse to Q₃. At the end of the time required to energize the inductor (L) the transformer saturates. Under this condition, Q₃ is turned off and the stored energy in L is passed to the output circuit which has previously been switched to the desired battery. During this charging period, the

(continued overleaf)

transformer core is being reset through the transformer winding associated with resistor R_2 .

The operating level of the input voltage is determined by the input sensing circuit comprised of D_1 , R_1 , Q_1 , and D_2 . These components are selected for operation at the peak power point on the voltage vs current curve of the solar cell source. Resistor R_1 limits the maximum current of Q_1 . A potentiometer may be substituted for R_1 for setting the circuit to compensate for any variation in the peak power point of the solar cell source.

Note:

Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
Goddard Space Flight Center
Greenbelt, Maryland 20771
Reference: B67-10481

Patent status:

No patent action is contemplated by NASA.

Source: John Paulkovich
(GSFC-519)